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Intellectual Property

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SUDHIR R. BRAHMBHATT

Appeal 2009-009795
Application 10/779,828
Technology Center 1600

Decided: March 25, 2010

Before ERIC GRIMES, DONALD E. ADAMS, and
RICHARD M. LEOVITZ, *Administrative Patent Judges*.

LEOVITZ, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 by the Patent Applicant from the Patent Examiner's rejection of claims 1, 3-6, 25, and 26 in U.S. Patent Application No. 10/779,828. The Board's jurisdiction for this appeal is under 35 U.S.C. § 6(b). The rejection is reversed.

STATEMENT OF THE CASE

The claims are drawn to fermentation processes in which substantially pure oxygen is the only gas continuously injected into a fermenter.

According to the Specification, the “invention is based on the discovery that the use of pure oxygen, injected into a fermentation vessel by a proper injection technique, significantly improves the oxygen utilization of the fermentation process, while maintaining a high level of safety. The direct injection of oxygen provides for safe, controlled dissolution of high purity oxygen in the fermenter.” (Spec. 8:10-15.)

Claims 1, 3-6, 25, and 26 are pending and stand rejected by the Examiner under 35 U.S.C. § 103(a) as obvious in view of the combination of Cheng A (US 2003/0080446 A1, May 1, 2003), Cheng B (US 5,798,254, Aug. 25, 1998), or Cheng C (US 5,985,652, Nov. 16, 1999); and Forsyth (EP 0 341 878 A1, Nov. 15, 1989) (Ans. 3).

Claim 1 is representative and reads as follows:

1. In a fermentation process, the process including the steps of placing a fermentation medium in a vessel, maintaining the fermentation medium in the vessel for a sufficient time to enable a fermentation process to occur in the vessel, and withdrawing a product from the vessel,
the improvement comprising injecting a stream of substantially pure oxygen into the vessel while the fermentation process is occurring, wherein the stream of substantially pure oxygen is the sole reactive gas, from any source external to the vessel, that is injected into the vessel, and wherein the stream of substantially pure oxygen is the only gas that is injected continuously into the vessel, and
wherein the stream of substantially pure oxygen is moved through the vessel solely due to pressure in an oxygen supply.

ISSUE ON APPEAL

The issue in this appeal is whether the combination of Forsyth with Cheng A, B, or C suggests a fermentation process in which a stream of substantially pure oxygen is the only gas that is injected continuously into the fermentation vessel. The issue turns on the interpretation of claims 1, 25, and 26.

CLAIM INTERPRETATION

There are three independent claims on appeal: claims 1, 25, and 26. Each of the independent claims is drawn to an improved fermentation process, where “the improvement compris[es] injecting a stream of substantially pure oxygen into the vessel while the fermentation process is occurring.”

Claims 1, 25, and 26 also recite that:

- “the stream of substantially pure oxygen is the sole reactive gas . . . that is injected into the vessel”; and
- “the stream of substantially pure oxygen is the only gas that is injected continuously into the vessel.”

Because the Specification does not define the phrase “substantially pure oxygen,” we turn to its ordinary and customary meaning. The “ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005). Evidence of the meaning of “pure oxygen,” as it would be understood by the skilled worker, is provided by Cheng B who discloses that “commercially pure oxygen” has an oxygen concentration of 99.5 mole percent or more

(Cheng B, col. 4, ll. 4-7). Consequently, we interpret “pure oxygen” as recited in the claims to refer to a gas with an oxygen concentration of 99.5 mole percent or more.

Claims 1, 25, and 26 expressly recite that “the stream of substantially pure oxygen is the only gas that is injected continuously into the vessel.” We therefore interpret the claim to be limited to a process in which a gas of substantially 99.5 mole percent or more of oxygen is the only gas continuously injected into the fermentation vessel. The claim excludes other gases from being injected continuously into the vessel.

FINDINGS OF FACT (FF)

Cheng A

1. Cheng A teaches that “[o]xygen is one of the essential nutrients that bacteria or fungus requires in an aerobic fermentation process. The oxygen is usually provided by sparging air through a sparge ring in a submerged culture fermentation broth. The sparge ring is often a round metal ring with tens or hundreds of holes drilled on it.” (Cheng A, p. 1, ¶ 2.)
2. Cheng A describes a fermentation vessel “comprising both air spargers and oxygen spargers therein” (*id.* at 1, ¶ 7).
3. Cheng A describes a method comprising “injecting air bubbles through the air spargers at the outer end of the vessel, and injecting oxygen bubbles downwardly through the oxygen spargers at the center of the vessel” (*id.*). A fermentation vessel with oxygen and air spargers is shown in Figs. 2 & 3 (*id.* at 2-3, ¶¶ 29 & 30).

Cheng B

4. Cheng B describes a fermentation method comprising injecting first and second oxygen containing gas into a fermentation vessel (Cheng B, col. 2, ll. 29-43).
5. “A first oxygen-containing gas, which is generally and preferably air, is injected” into the fermentation vessel (*id.* at col. 3, ll. 45-56).
6. “Second oxygen-containing gas, having an oxygen concentration exceeding that of the first oxygen-containing gas, is injected” into the fermentation vessel (*id.* at col. 3, l. 65 to col. 4, l. 2).
7. “The second oxygen-containing gas may also be commercially pure oxygen having an oxygen concentration of 99.5 mole percent or more.” (*Id.* at col. 4, ll. 4-7.)

Cheng C

8. Cheng C is a divisional of Cheng B (Cheng C, col. 1, ll. 3-5) and contains the same disclosure as in Cheng B.

Forsyth

9. Forsyth describes a “fermentation process and a fermenter in which aeration is improved by injecting substantially pure oxygen into a culture medium by means including a venturi (14) located outside the main body of the fermenter.” (Forsyth, p. 1, Abstract.)
10. “Air and/or an inert gas is injected into culture in the main body of the fermenter in a volume greater than the volume of oxygen injected into culture in the compartment [external to the fermenter].” (*Id.* at 2, ll. 46-47; *see also* ll. 15-20.)

11. Forsyth does not describe injecting oxygen into the fermentation vessel; rather, the oxygen is injected outside the main body of the fermentation vessel (FF9, FF10).

ANALYSIS

The Examiner interpreted claims 1, 25, and 26 to encompass fermentation processes comprising continuously injecting an oxygen gas and a non-reactive gas into a fermenter. Citing Cheng A, B, and C for teaching the continuous injection of separate oxygen and air streams into a fermenter, the Examiner found that it would be obvious to have substituted a non-reactive gas, as taught by Forsyth, for the Cheng's air stream (Ans. 5).

The Examiner's rejection is based on an improper interpretation of the claims. Claims 1, 25, and 26 recite that "the stream of substantially pure oxygen is the sole reactive gas . . . that is injected into the vessel." However, the claims also recite that "the stream of substantially pure oxygen is the *only* gas that is injected continuously into the vessel," excluding the continuous injection of another gas – reactive or not. (Emphasis added.) Because the Examiner improperly interpreted the scope of claims 1, 25, and 26, the Examiner did not address the limitation of the claims that required the substantially pure oxygen to be the only gas continuously injected into the fermenter. Consequently, we are compelled to reverse the rejection.

CONCLUSION OF LAW

The Examiner improperly interpreted the scope of the claims. Claims 1, 25, and 26 are limited to fermentation processes in which substantially pure oxygen is the only gas continuously injected into the fermenter vessel. Because the Examiner did not meet the burden of showing that this limitation was taught or suggested by the prior art, we reverse the obviousness rejections claims 1, 3-6, 25, and 26.

REVERSED

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